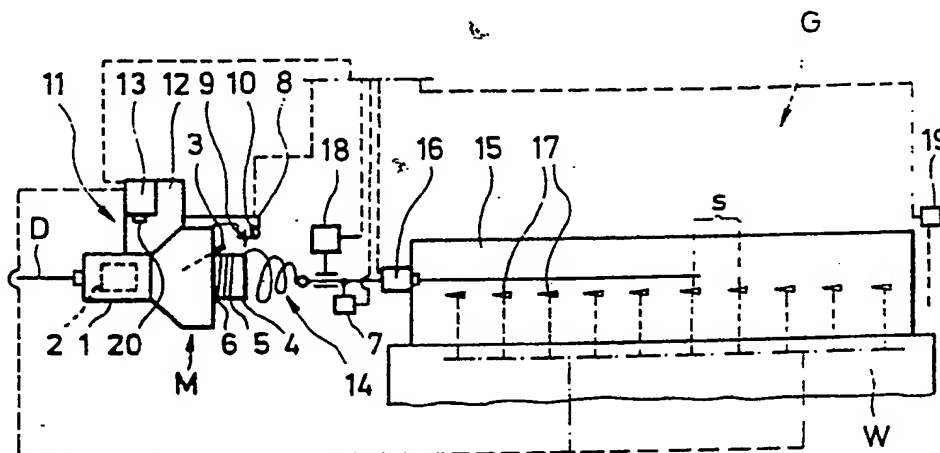




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(54) Title: METHOD FOR CONTROLLING A WEFT PROCESSING SYSTEM AND MEASURING FEEDER

**(57) Abstract**

A method for controlling a weft processing system of at least one measuring feeder (M) and a jet weaving machine (W) in which passing signals are used for measuring the weft sections consumed by the jet weaving machine (W). The same passing signals are used to at least initiate one auxiliary control function which is related to the movement of the weft in the shed of said jet weaving machine (W). In order to adapt at least the initiation of the auxiliary control function to the actual movement of the weft tip in the shed during one insertion, a deviation between the movement of the weft tip assumed on the basis of the weft passing signals and the actual movement of the yarn tip influenced at least by a withdrawal-balloon (14) is detected for deriving proportional correction values. Said correction values are associated with said weft passing signals so that said auxiliary control function can be initiated for at least one later insertion on the basis of one weft passing signal and the correction value associated therewith.

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METHOD FOR CONTROLLING A WEFT PROCESSING SYSTEM AND MEASURING FEEDER

DESCRIPTION

The invention relates to a method for controlling a weft processing system according to the precharacterizing part of claim 1 and to a measuring feeder according to the precharacterizing part of claim 12.

In a method as known from WO84/02360 the weft passing signals are used for measuring the length of the weft section that is to be released for one insertion. The same weft passing signals are used to actuate as an auxiliary control function, an array of weft conveying nozzles provided within the shed of the jet weaving machine. The said nozzles are actuated in consecutive groups with an overlap between adjacent groups. Each group must be actuated shortly before the weft tip reaches the first nozzle of the group and may be deactivated as soon as the weft tip has passed the group. During insertion of a weft section, a withdrawal-balloon is formed in which a considerable length of the weft is stored throughout the insertion. The control unit in the measuring feeder simulates the movement of the weft tip through the shed based on the weft passing signals, i.e., as if the weft section were inserted in a completely stretched out state with the weft tip moving in synchronism with the weft leaving the measuring feeder. However, due to the withdrawal-balloon and due to further influences which depend on various external factors, such as the yarn quality, the machine speed, the yarn geometry between the measuring feeder and the shed, etc., the weft tip in the shed is delayed relative to its position as

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defined by the weft passing signals. Consequently, defining the actual position of the weft tip in the shed on the basis of the weft passing signal leads to an untimely actuation of the auxiliary control function, since the auxiliary control function should be strictly related to the true movement of the weft tip through the shed. In order to compensate for said error, it is customary in practice to set the actuation time for each nozzle group longer than necessary in order not to jeopardize the conveyance of the weft through the shed. This safety measure not only leads to a waste of energy but also can cause disturbances in the conveyance of the weft because excessive amounts of the transport medium tend to deflect the weft due to air-turbulences.

In a method as known from DE-A1 31 34 928, the auxiliary control function is the actuation of a weft brake for measuring the weft section. The deviation between the calculated movement of the weft and the actual movement due to the withdrawal-balloon leads to incorrectly measured weft sections.

In a method as known from EP 264 985, a plurality of weft passing sensors and stopping devices is provided for gaining the necessary high resolution for the measurement of the weft section on a fixed diameter storage surface. The movement of the weft as defined by the passing signals deviates from the true movement of the weft tip through the shed. Initiating any auxiliary control functions related to the true movement of the weft tip through the shed is incorrect if it is carried out on the basis of the passing signals.

It is an object of the present invention to create a

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method according to the precharacterizing part of claim 1 that allows the actuation of any auxiliary control function in true relation to the movement of the weft tip through the shed. It is also a task to create a measuring feeder for controlling auxiliary control functions in true relation to the the movement of the weft in the shed of a jet weaving machine.

This can be achieved by the steps contained in the characterizing part of claim 1 and by a measuring feeder having the features mentioned in the characterizing part of claim 12.

According to the method, at least the initiation of the auxiliary control function, which initiation is carried out on the basis of the weft passing signals, is adapted to the true movement of the weft tip through the shed with the help of the correction values. The correction values take the deviation between the assumed movement of the yarn and the true movement of the yarn into consideration and enable the control unit to simulate the true movement of the weft tip in the shed even though the initiation is carried out on the basis of the weft passing signals. The method is self-learning and continuously adapting in order to compensate the individual error caused by, for example, the withdrawal-balloon. The method is based on the fact that only the arrival signal truly represents the position of the weft tip when it reaches the distant end of the shed, whereas its actual movement through the shed is different from the theoretical movement as represented by the weft passing signals. By correlating the weft passing signals and the arrival signal, the control unit is able to simulate the true movement of the weft through the shed

for at least one later insertion on the basis of the weft passing signals with the help of the associated correction values. The method adapts itself, for example, to the yarn quality or the size of the withdrawal-balloon, because, with a bigger withdrawal-balloon, the deviation is larger and, consequently, the correction values become larger. The method can be carried out through a starting- or adjusting-phase of the system, or can even be carried out throughout the entire operation of the system in order to reach optimum insertion conditions for the jet weaving machine. Adaptation of the auxiliary control function means that the initiation and/or the switching-off, as well as the level of the auxiliary function, will be adapted alternatively or in addition. The level of the auxiliary function, for example, is the braking-level or -intensity, the pressure supplied to the main nozzle, the pressure or nominal flow rate value in the relay nozzles, etc. The adaption of the auxiliary control function will, in some cases, be carried out proportionally to the detected deviation but, in other cases, inversionally proportionally to the magnitude of the detected deviation, e.g., an adaptation to a higher braking level for a faster moving weft and vice versa.

In an advantageous embodiment of the method, a time-related correction or adaptation is made by means of correction times for the weft passing signals. Upon occurrence of a weft passing signal, which is relevant for at least the initiation of the auxiliary control function, the correction time that is assigned to said relevant weft passing signal is taken into consideration before the auxiliary control function is initiated. The initiation takes place at a point in time at which the

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weft tip is present at a predetermined position.

According to an alternative advantageous embodiment of the method, the control unit becomes enabled to initiate the auxiliary control function in relation to the true position of the weft tip in the shed by means of individual correction lengths as soon as the control unit is prepared to initiate the auxiliary control function upon occurrence of a weft passing signal that indicates a theoretical position of the weft tip in the shed. The correction length is taken into consideration so that the weft tip actually reaches the predetermined position when the auxiliary control function is initiated.

According to a further embodiment, said correction lengths can easily be derived by means of the detected time difference and the maximum weft speed during the insertion with approximately linear increase from one weft passing signal to the next weft passing signal.

Similarly and according to a further embodiment of the method for a time-related correcting of the weft passing signal, the correction time can be derived with approximately linear increase from one weft passing signal to the next weft passing signal so that each later occurring weft passing signal has associated therewith a larger correction time than the preceding one.

According to a further advantageous embodiment of the invention, the individual correction times can be calculated precise enough on the basis of the length of the weft stored in at least the withdrawal-balloon.

In accordance with a further advantageous embodiment of

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the inventive method, not only the initiation of the auxiliary control function but also the switching off of the auxiliary control function is corrected in a time-related way. The switching-off correction time can be longer than the correction time for the initiation of the auxiliary control function.

According to a further advantageous embodiment of the method, a signal of an arrival sensor is used to derive the correction times or the correction lengths. The arrival sensor is positioned outside the shed in a position where it generates a clear and precise arrival signal.

As an alternative advantageous embodiment, a maximum yarn tension signal of a tensiometer can be used as the arrival signal indicating that the weft tip has reached a predetermined position in the shed or the end of the shed. Due to an unavoidable whip-lash-effect at the end of each insertion-cycle, a weft tension peak occurs when the weft becomes stretched out. The time difference between the occurrence of said tension peak and the last passing signal is used as an indicative deviation value for deriving correction values.

According to a further embodiment, the auxiliary control function is braking the weft at the end of the insertion in order to avoid an excessive tension increase. It is of particular importance that the braking action starts precisely when the weft tip has reached a predetermined position on its movement through the shed and is maintained over a predetermined weft-travel so that the free end comes to a standstill at the end of the shed. If these prerequisites cannot be maintained, the insertion

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time becomes longer than allowed which disturbs the operation of the jet weaving machine or the braking effect becomes too weak so that the tension increase in the weft is too high. By adapting the braking function precisely to the true movement of the weft tip through the shed, an optimum insertion condition is assured. This means that even the braking level will be adapted.

According to a further embodiment, the auxiliary control function is the actuation of a main nozzle and/or of relay nozzles. An adaptation of the actuation of said nozzles means a correction of the initiation and/or switching-off point in time and/or a correction of the nozzle pressure or the nominal nozzle flow rate value.

In the measuring feeder according to the invention, the correction module assists the control unit in adapting at least the initiation of the auxiliary control function to the true movement of the weft tip through the shed even though the control unit responds to the weft passing signals which cannot represent a true movement of the weft. The correction module derives correction values from the detected deviation and, thus, enables the control unit to wait either exactly to the point in time where the weft tip has reached the predetermined position or to wait for the correction length with which the weft tip reaches the predetermined position.

According to a further advantageous embodiment, the correction module is structurally integrated into the control unit so that the measuring feeder continuously adapts at least the initiation of the auxiliary control function to the true movement of the weft tip.

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According to another advantageous embodiment, the correction module is a removable controller that is connected to the control unit solely during a starting or adjustment-operation-phase in order to adapt the system of the measuring feeder and its jet weaving machine to the individual insertion conditions.

The invention will now be described with reference to the accompanying drawings. The drawings show in

- Fig.1 a schematic plan view of a weft processing system during insertion,
- Fig.2 the weft processing system of Figure 1 at the end of an insertion cycle,
- Fig.3 a diagram representing two different speed profiles,
- Fig.4 a diagram representing one embodiment of the inventive method,
- Fig.5 another embodiment of the inventive method, and,
- Fig.6 a diagram relating to another embodiment of the inventive method.

In a weft processing system G, a measuring feeder M is associated to a jet weaving machine W, preferably an airjet weaving machine, for delivering measured sections of equal length of a weft D. The measuring feeder M comprises a stationary housing 1 containing a drive 2 for a rotating winding-on member 3. A storage body 4 forms a

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drum-like storage surface 5 for windings 6 of the weft D. Said storage body 4 is mounted on said housing 1 in a coaxial position. The weft D is withdrawn from a reserve bobbin (not shown) and is guided through the housing 1 and the winding-on member 3 towards said storage surface 5. From the windings 6 on the storage surface 5, the weft is withdrawn over the free end of the storage body 4 into a shed 15 of the jet weaving machine W. At least one stopping device 8 is mounted on housing 1. It contains a stop element 9 which is movable into the path of the weft in order to stop the weft from being withdrawn. In a retracted position, said stop element 9 allows withdrawal of the weft. In the stopping device 8, a weft passing sensor 10 is provided which surveys the weft passing below the stopping device 8. A control unit 11 which is either structurally integrated into the housing 1 or provided at a distance from said housing 1 controls drive 2 for winding-on member 3 in order to maintain a sufficient number of windings 6 on the storage surface 5. Control unit 11 comprises a control part 12 which serves to measure each weft section during its release on the basis of weft passing signals generated by weft passing sensor 10. Stopping device 8 is actuated as soon as the required weft section length is reached (Figure 1).

In cases where only one stop element 9 is provided the diameter of the storage body 4 can be adjusted in order to adapt the weft section length to a full number of windings 6. In the case where a plurality of stop elements and preferably a plurality of weft passing sensors 10 is provided, the diameter of the storage body 4 is fixed. The weft section length then is adjusted by selecting the respective stop element 9 which is to be actuated at the end of an insertion cycle (not shown).

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Control unit 11 further serves to actuate, for example, devices 16,17,18 for auxiliary control functions relating to the movement of the weft through shed 15 of jet weaving machine W. Device 18 is a so-called insertion brake for braking the weft at the end of the insertion cycle in order to avoid excessive tension peaks in the weft. Device 17 is a series of so-called conveying nozzles that are arranged within shed 15. They are used to transport the weft through the shed 15. Device 16 is a nozzle at the entrance of shed 15 for withdrawing weft D from measuring feeder M and to hold the weft in stretched position between insertions between the jet weaving machine W and the measuring feeder M. Each of the devices 16,17,18 can be connected to control part 12 of control unit 11 so that it can be actuated and deactuated by control unit 11, respectively. Since control unit 11 has information on the position of the weft in the shed or the position of the weft tip on its travel through the shed 15 by means of weft passing signals of the weft passing sensor 10, said weft passing signals are used to time not only the actuation and deactuation of stop element 9 but also of at least one of the devices 16,17,18 in relation to the position of the weft tip.

Control unit 11 further comprises a correction module 13 which is connected to control part 12 and serves to adapt the control of the auxiliary functions of devices 16,17,18 to the true movement of the weft through shed 15 which true movement is different from the movement of the weft through shed 15 as defined on the basis of the weft passing signals. Outside of the end of shed 15 distant from measuring feeder M, an arrival sensor 19 is provided which surveys whether the weft tip reaches the end of the

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shed or not and which generates an arrival signal as soon as the weft end arrives. Instead of or in addition to arrival sensor 19, a tensiometer 7 can be provided which continuously checks the tension in the weft. Said tensiometer 7 automatically detects a maximum tension and generates a respective signal at the end of an insertion cycle when the weft has become stretched out and the weft tip has reached the position of the arrival sensor 19.

During an insertion (Figure 1), stop element 9 is retracted so that the weft can be withdrawn from windings 6 in a spiralling manner. A withdrawal-balloon 14 is formed which stores a certain length S of the weft during insertion. Due to the withdrawal-balloon 14, the weft tip travels with a certain lag behind the respective positions which are assumed on the basis of the weft passing signals in control unit 11. In other words, control unit 11, is constantly informed of the position of the weft tip in the shed because, with each weft passing signal, one winding has been consumed and the weft tip should have moved further for that distance. However, due at least to the withdrawal-balloon 14, the true movement of the weft tip does not correspond to the assumed movement. Correction module 13 is used to detect the deviation between the true movement of the weft tip and the assumed movement of the weft tip and to assist control unit 11 in adapting the actuation of devices 16,17,18 to the true movement of the weft tip.

Devices 16,17,18, as well as arrival sensor 19 or tensiometer 7 and weft passing sensor 10, are connected to control unit 11 either for signal transmission or for actuation.

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In Figure 2, the insertion is terminated after moving stop element 9 into the weft path so that no more weft can be withdrawn. By the inertia of the weft in shed 15 and, due to the nozzles 16 and 17, the delivered weft becomes stretched so that the withdrawal-balloon vanishes. The weft tip reaches the arrival sensor 9. Then, the weft is cut and is beaten up in conventional manner. Figures 3 to 6 illustrate how the system of Figures 1 and 2 is controlled.

The diagram of Figure 3 depicts two speed profiles. The horizontal axis represents the time axis; the vertical axis, the weft speed. Curve VD represents the weft speed in the vicinity of weft passing sensor 10. Curve VT represents the speed of the weft tip. Vertical lines 1 to 5 represent the consecutively generated weft passing signals. Arrow t9 illustrates the point in time when the weft becomes caught by stop element 9. Due to at least the withdrawal balloon 14, the weft tip profile VT is different from the speed profile VD. As soon as the weft becomes caught at stop element 9 and becomes decelerated, the weft tip continues to travel as long as the balloon diminishes and the weft becomes stretched out. At point X (arrival signal) the weft tip reaches the arrival sensor. f represents the time between consecutive weft passing signals nos. 4 and 5. The time-periods between several of all weft passing signals of one insertion cycle are essentially equal, while the time-distance between start of the insertion-cycle and the very first weft passing signal, as well as between the first weft passing signals, is longer due to the time necessary to reach maximum weft speed (Figure 3 is schematic with respect to this fact and for simplicity's sake). Time-difference a represents the time between the last weft passing

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signal(s) and the arrival signal X. During time difference a , the weft tip becomes decelerated from approximately maximum weft speed to zero. Time difference a is detected in control unit 11 and is used to derive, with the assistance of correction module 13, at least one correction time for the adaptation of the initiation of at least one of the auxiliary control functions to the true movement of the weft tip.

Figure 4 illustrates how the insertion brake 18 is actuated as the auxiliary control function. Insertion brake 18 must be actuated at a time-period t_{18} after occurrence of weft passing signal 4, provided that the weft tip has reached a predetermined position. Since there is the deviation of the true movement from the movement of the weft tip as defined on the basis of the weft passing signals, weft tip has not reached the predetermined position when t_{18} has expired after occurrence of weft passing signal 4. However, correction module 13 has derived a correction time K from the measured time-difference a and has assigned a correction time K to weft passing signal 4. During a later insertion cycle, upon occurrence of weft passing signal 4, firstly, correction time K and, secondly, time-period t_{18} (equal to d) pass before insertion brake 18 becomes actuated. Of course, insertion brake 18 will not immediately start to brake the weft because it has a certain response time. However, said response time is constant and is taken into consideration per se. In other words, control unit 11 is prepared to actuate insertion brake 18 upon occurrence of weft passing signal 4 and passage of t_{18} . But correction module 13 has assigned correction time K to weft passing signal 4 so that control unit 11 actuates insertion brake 18 upon occurrence of weft passing signal 4 after the

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expiration of correction time K and passage of t_{18} , i.e., after expiration of time-period t_{18}' which is longer than time-period t_{18} . By this method, the actuation of insertion brake 18 takes place exactly when the weft tip has reached the position at which the actuation of the brake should take place.

To derive correction time K from time-difference a as detected, the value of time-period a is converted by calculation to the maximum weft speed in speed profile VD .

Time-period $t_{18} = d$ is predetermined with regard to an optimum insertion condition, i.e., to suppress an excessive tension peak but, nevertheless, to ensure that the weft tip reaches the position of the arrival sensor within the insertion time allowable for one pick. If the weft is to be braked until the weft tip has reached the arrival sensor, the braking-duration is known. Time-period t_{18} can, then, easily be calculated by subtracting the braking duration (including the response time of the brake) and the correction time K from the total time of the occurrence of the arrival signal at point X . By doing so, the last "safe" weft passing signal (in Figure 4 weft passing signal 4) and the time-period t_{18} are found easily for a later insertion.

The short time difference between the last weft passing signal 5 and point in time t_9 can be neglected because the weft is normally caught by the stop element 9 immediately after the weft has passed passing sensor 10 the last time. If there is a considerable time-period between the last passing signal and the point in time t_9 , a constant value (depending on the known speed) can be

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brought into the calculation of correction time K . In the case of a measuring feeder with a plurality of stop elements and several weft passing sensors, the time delay between the last weft passing signal and a point in time where the weft is caught by the respective and selected stop element can be taken into consideration by means of the known average speed which easily allows the calculation of when the weft reaches the activated stop element.

Figure 5 illustrates how conveying nozzles 17 are actuated in two groups and in relation to the true movement of the weft tip. Group I is to be actuated upon occurrence of weft passing signal 2 plus time period t_I and should be active over duration $1I$. Group II is to be actuated upon occurrence of weft passing signal 3 plus time-period t_{II} , provided that the weft tip has already reached two pre-determined respective positions in the shed. Due to the deviation between the true movement of the weft tip and the movement of the weft tip as assumed on the basis of the weft passing signals, a correction time K is associated with weft passing signals 2 and 3. As a result, group I is actuated during a later insertion cycle upon occurrence of weft passing signal 2 and expiration of time-period t_I plus correction time K , while group II is actuated upon occurrence of weft passing signal 3 and expiration of time-period t_{II} plus correction time K . As a consequence, the two groups I and II are precisely actuated in relation to the true position of the weft tip.

It is to be noted that, of course, instead of correction times K , correction lengths can be associated with the respective weft passing signal when the control unit

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controls the auxiliary control function in direct relation to the travel of the weft tip through the shed. The momentary position of the weft tip is known at least upon occurrence of the respective weft passing signal because the maximum weft speed and the length of each winding are known.

Figure 6 illustrates a method for deriving individual correction times K_1 to K_5 for the respective weft passing signals 1-5. The vertical axis represents length S . For weft passing signal 5, the detected time difference a (Figure 3) is converted by calculation into maximum length S_a of weft that is stored at least in withdrawal-balloon 14. Said length S_a is approximately equal to a times V_{max} divided by two, because the deceleration between the last passing signal 5 and point X can be assumed as approximately linear. Then, over the entire insertion time, an approximately linear length-increase is assumed from zero to S_a . Thus, for weft passing signals 1-4, individual partial lengths S_1, S_2, S_3 , and S_4 can be found. Each partial length is then converted by calculation to the maximum weft speed V_{max} (Figure 3) so that individual correction times K_1 to K_5 are found which are then associated with the respective weft passing signals. For example, correction time K_3 approximately equals S_3 divided by V_{max} . The respective calculations are carried out with the help of correction module 13. The correction times or correction lengths are then associated with the respective weft passing signal and are taken into consideration for at least one later insertion.

CLAIMS

1. Method for controlling a weft processing system consisting of at least one measuring feeder and a jet weaving machine, said method comprising subsequently measuring sections of a predetermined length of a weft for said jet weaving machine, said measuring being carried out by processing consecutively produced weft passing signals of at least one weft passing sensor on said measuring feeder in a control unit, and initiating at least one auxiliary control function in relation to the movement of the weft in the shed of said jet weaving machine on the basis of said weft passing signals during an insertion cycle,

characterized by the following steps:

a) detecting a deviation of the actual movement of the weft tip from the theoretical movement of the weft tip as defined on the basis of the weft passing signals during one insertion cycle, said detection being carried out on the basis of the last weft passing signal of the insertion cycle, and an arrival signal representing the arrival of the weft tip at the shed-end remote from said measuring feeder,

b) deriving proportional correction values from said detected deviation and assigning the correction values to said weft passing signals, and

c) actuating the auxiliary control function on the basis of one weft passing signal and the correction

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value assigned thereto during at least one following insertion cycle, in order to adapt the auxiliary control function, e.g., its initiation, to the actual movement of the weft tip in the shed.

2. Method according to claim 1, characterized by the following steps:

a) detecting a time difference between the last weft passing signal and the arrival signal,

b) deriving correction times for said weft passing signals from said detected time difference and assigning the correction times to said weft passing signals,

c) selecting a relevant weft passing signal for the initiation of the auxiliary control function, and

d) actuating the auxiliary control function during at least one later insertion cycle on the basis of the selected and time-corrected relevant weft passing signal.

3. Method according to claim 1, characterized by the following steps:

a) detecting a linear longitudinal difference between the position of the weft tip in the shed as defined on the basis of the last weft passing signal and the actual position of the weft tip on the basis of the arrival signal during an insertion cycle,

b) deriving correction lengths from said detected

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linear longitudinal difference for the positions of the weft tip in the shed as defined on the basis of the weft passing signals and adding the correction lengths to the weft passing signal positions of the weft tip,

c) selecting a relevant weft passing signal for a position of the weft tip in the shed at which the auxiliary control function is to be initiated, and

d) actuating said auxiliary control function during at least one later insertion cycle at the relevant weft passing signal position of the weft tip corrected by its added correction length.

4. Method according to claim 3, characterized by the following steps:

a) calculating the linear longitudinal difference by means of the maximum weft speed during the insertion cycle and the time difference between the last weft passing signal and the arrival signal, and

b) deriving said correction lengths for the respective yarn passing signals from the calculated linear longitudinal difference and assigning the correction lengths to the respective weft passing signals in such a way that there is an essentially linear increase of correction length from one weft passing signal to the next.

5. Method according to claim 2, characterized in that the respective correction times are derived from the time difference with approximately linear increase

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from one weft passing signal to the next weft passing signal.

6. Method according to claims 2 and 5, characterized by the following steps:

a) detecting the time difference between the last weft passing signal and the arrival signal,

b) calculating the length of the weft retained at least in the withdrawal-balloon based on the detected time difference which difference represents the deceleration phase of the weft from the maximum weft speed to zero,

c) deriving from the length calculated under b) an individual partial length for each weft passing signal with an essentially linear increase from zero to the calculated length from signal to signal, and

d) calculating for each weft passing signal an individual correction time based on the maximum weft speed and the individual partial length.

7. Method according to claims 1, 2, 5 and 6, characterized in that the initiation of the auxiliary control function is delayed by the individual correction time assigned to said relevant weft passing signal upon occurrence of the relevant weft passing signal, and

that switching off of the auxiliary control function is delayed by another individual correction time

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least one later insertion cycle to the actual weft movement by said correction module (13) based on said deviation.

13. Measuring feeder according to claim 12, characterized in that said correction module (13) is structurally integrated into said control unit (11).
14. Measuring feeder according to claim 12, characterized in that said correction module (13) is a programmable removable controller, and that said control unit (11) is provided with a connecting-interface for temporarily connecting the controller to the control unit, e.g., during a starting- or adjustment-operation phase of the measuring feeder (M).

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comprising a measuring device with at least one stopping device associated with the storage surface and having a stop element being movable into the withdrawal path of the weft, further comprising at least one weft passing sensor generating weft passing signals upon surveying the withdrawal path of the weft; and further comprising a control unit comprising at least one microprocessor, which control unit has a signal transmitting connection to the weft passing sensor and an arrival signal generating sensor responding to the movement of the weft through the shed of the jet weaving machine, wherein additional devices for at least one auxiliary control function, the actuation of which is related to the movement of the weft through the shed, are in actuationconnection with the control unit which is adapted to actuate said devices on the basis of weft passing signals,

characterized in that

said control unit (11) is provided with at least one correction-module (13) for delaying the actuation of said devices (16,17,18),

said correction-module (13) responding to a deviation of the actual weft movement as defined on the basis of the arrival signal during an insertion cycle and the theoretical weft movement as defined on the basis of the weft passing signals in the control unit (11), and

the actuation of the auxiliary control function-devices (16,17,18) is adaptable during at

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assigned to a later weft passing signal upon occurrence of said later weft passing signal which is relevant for the switching off of the auxiliary control function.

8. Method according to claims 1 to 7, characterized in that a signal of an arrival sensor is used as the arrival-signal which sensor is located outside the shed for surveying the weft tip.
9. Method according to claims 1 to 7, characterized in that a maximum tension signal of a tensiometer is used as the arrival signal which tensiometer is provided to survey the weft tension during insertion.
10. Method according to claims 1 to 9, characterized in that the auxiliary control function is a weft braking function carried out by a weft insertion brake located downstream of the measuring feeder.
11. Method according to claims 1 to 9, characterized in that the auxiliary control function is the actuation of a main nozzle at the entrance of the shed and/or of relay nozzles located along the shed which are activated and deactivated, preferably in groups and with an overlap between the groups.
12. Measuring feeder for a jet weaving machine, comprising a storage surface for a weft wound on in windings, which weft is spiralling and intermittently withdrawn in discretely released measured sections during insertion cycles, further

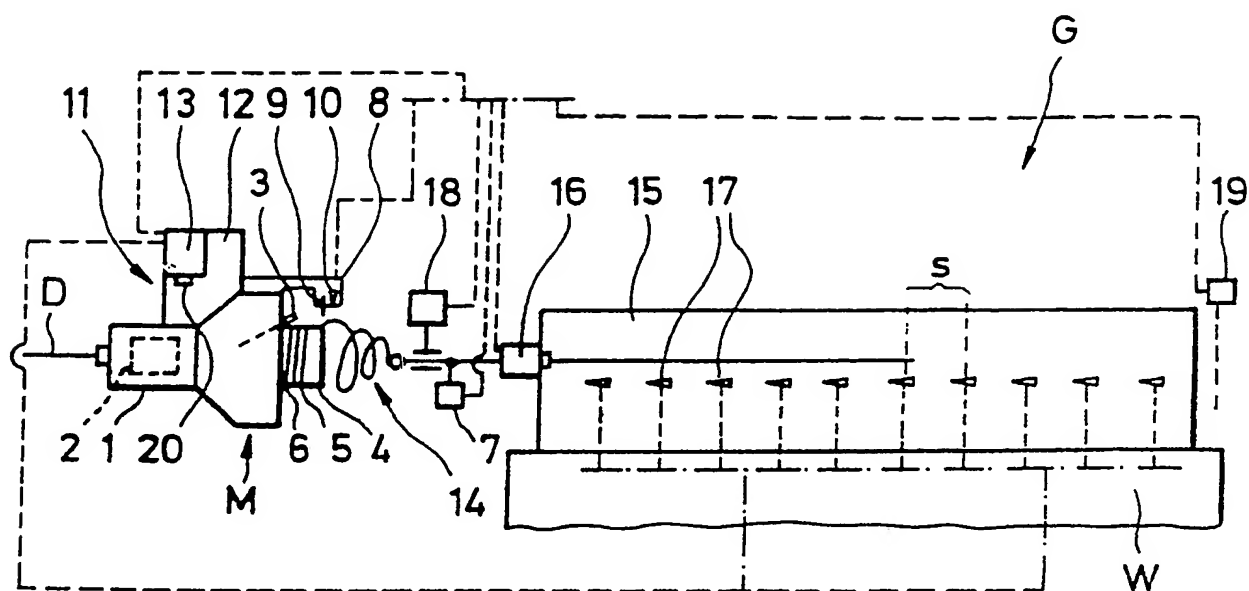


FIG. 1

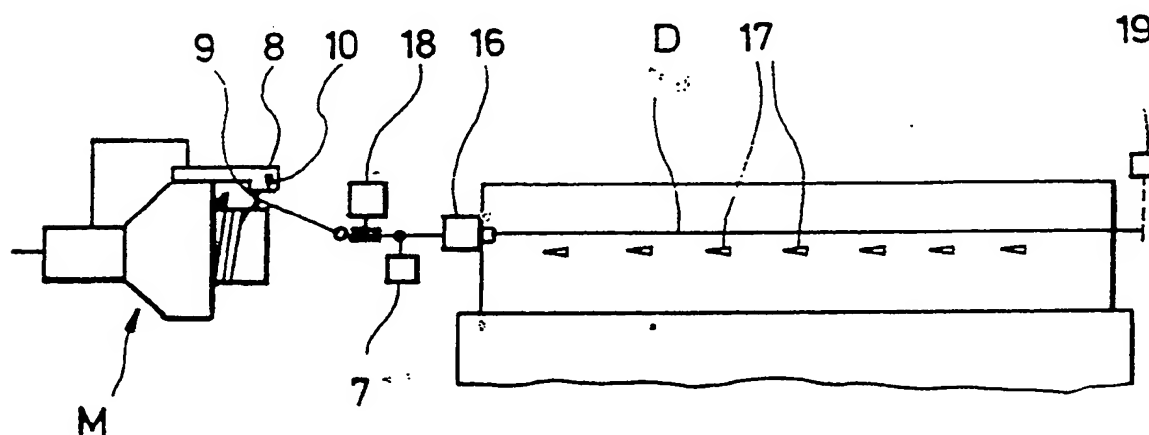


FIG. 2

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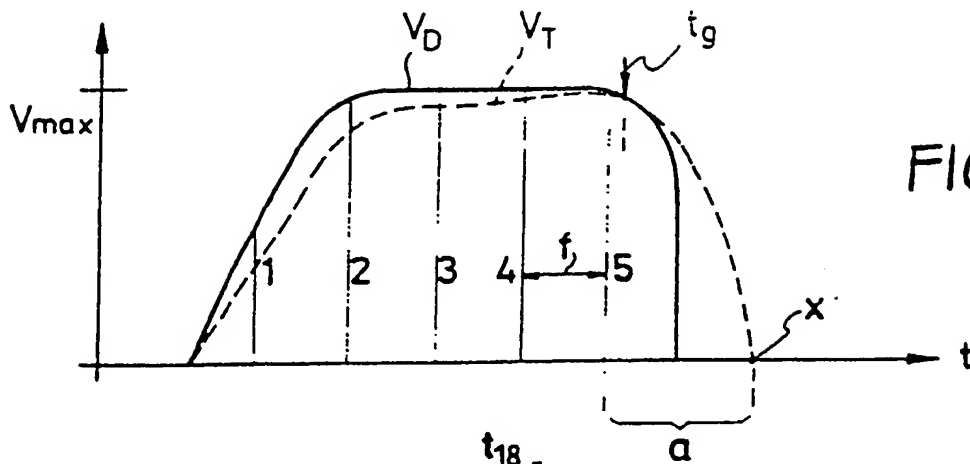


FIG 3

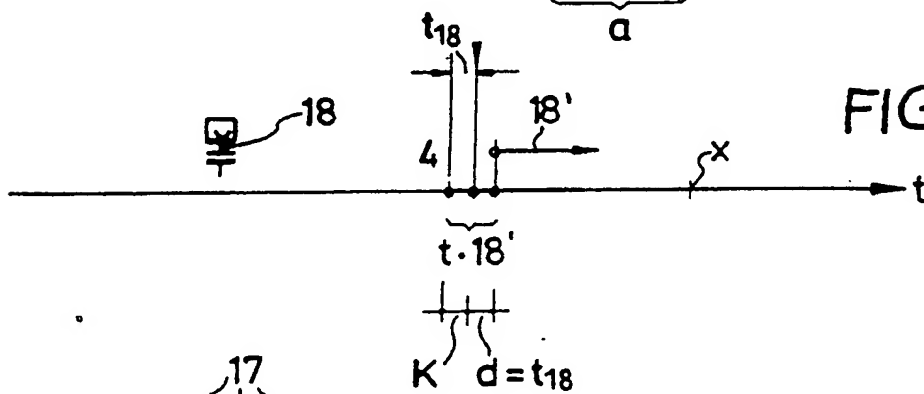


FIG 4

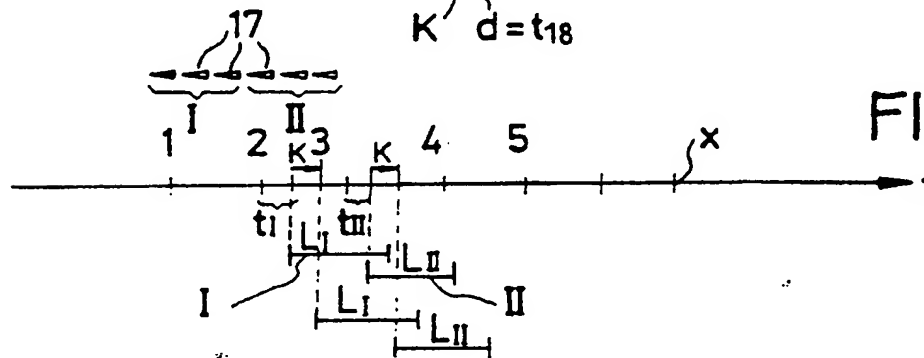


FIG 5

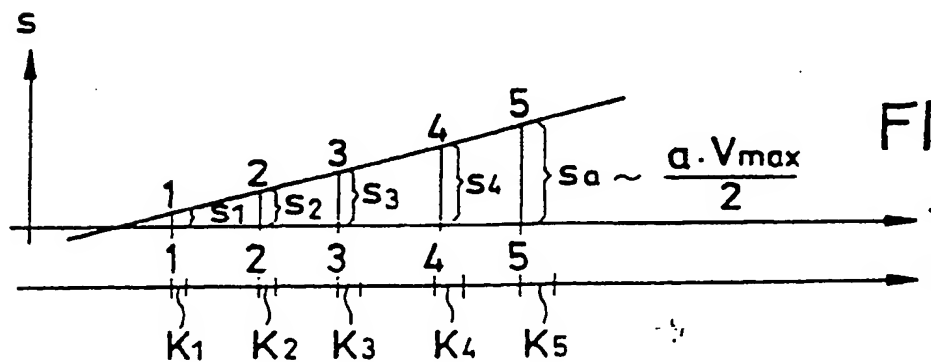



FIG 6

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INTERNATIONAL SEARCH REPORT

PCT/EP 91/01724

International Application No

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. 5 D03D47/30; D03D47/36		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. 5	D03D	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	EP,A,0 222 410 (TSUDAKOMA) 20 May 1987 see abstract; figure 1 ---	1,2,11, 12
A	EP,A,0 247 225 (IRO) 2 December 1987 see the whole document ---	1-3
A	WO,A,8 402 362 (IRO) 21 June 1984 see page 1, line 1 - page 2, line 11 ---	1
A	EP,A,0 263 445 (TSUDAKOMA) 13 April 1988 see column 2, line 45 - column 4, line 38 ---	11
A	WO,A,8 402 360 (IRO) 21 June 1984 cited in the application see claims 1,2; figures 1,2 ---	1
-/--		
<p>¹⁰ Special categories of cited documents : ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
1 13 NOVEMBER 1991	25 NOV 1991	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	BOUTELEGIER 	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	DE,A,3 134 928 (RUTI) 27 May 1982 cited in the application see claim 1	1
A	EP,A,0 264 985 (PICANOL) 27 April 1988 cited in the application	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. EP 9101724
SA 50819**

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